Rail Accident Investigation Branch

Rail Accident Investigation: Interim Report

Collision between passenger trains near Elstow, Bedfordshire
19 June 2026

Report IR1/2026
October 2026

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Note: This interim report contains information obtained as part of the Rail Accident Investigation Branch's (RAIB) ongoing investigation. Some of the information contained in this report may be refined or changed as the investigation progresses.

The purpose of an RAIB investigation is to improve safety by preventing future railway and tramway accidents or by mitigating their consequences. It is not the purpose of such an investigation to establish blame or liability. Accordingly, it is inappropriate that RAIB reports should be used to assign fault or blame, or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

Collision between passenger trains near Elstow, Bedfordshire, 19 June 2026

Introduction

1 At around 17:13 on Friday 19 June 2026, train reporting number 1H46, the 16:40 passenger service from Corby to London St Pancras, collided with the rear of train reporting number 1B67, the 15:50 passenger service from Nottingham to London St Pancras. Train 1B67 was stationary when the accident occurred. Both trains were operated by East Midlands Railway (EMR).

2 The collision took place on Network Rail's Midland Main Line approximately 2.5 miles (4 km) south of Bedford station (figure 1). The driver of train 1H46 suffered fatal injuries in the collision. Of the estimated 257 people on board the two trains, more than 160 were injured. Significant damage was caused to the trains, both of which derailed.

3 Train 1B67 was stationary beneath the gantry supporting signal WH152 when the accident occurred (figure 2) and had come to an unexpected stop following an automatic emergency brake application. As train 1B67 was occupying the track in the vicinity of signal WH152, the preceding signal, WH154, was displaying a red (danger) aspect to protect the train from other movements on that line.

4 Forward-facing CCTV (FFCCTV) footage from train 1H46 shows that, as it approached and passed signal WH154, the signal was correctly displaying a red aspect. Train 1H46 was travelling at approximately 58 mph (93 km/h) and accelerating when it passed this signal.

5 Having passed signal WH154, train 1H46 proceeded towards train 1B67, approaching it on a right-hand curve. Analysis of data downloaded from the on-train data recorders (OTDR, sometimes called 'the black box') fitted to train 1H46 shows that the driver first applied the brakes around 10 seconds before the collision, while the train was travelling at approximately 76 mph (122 km/h). OTDR data also indicates that the speed of the train had reduced to around 50 mph (80 km/h) at the point of collision.

6 RAIB investigations, like many others, start by examining the immediate events around an accident and then working outwards to determine why they occurred, and to find any underlying factors. That means that a report published at the early stages of an investigation may contain information about immediate events without necessarily providing an explanation as to why they occurred. The reasons why train 1H46 passed signal WH154 at danger continue to form part of the ongoing investigation.

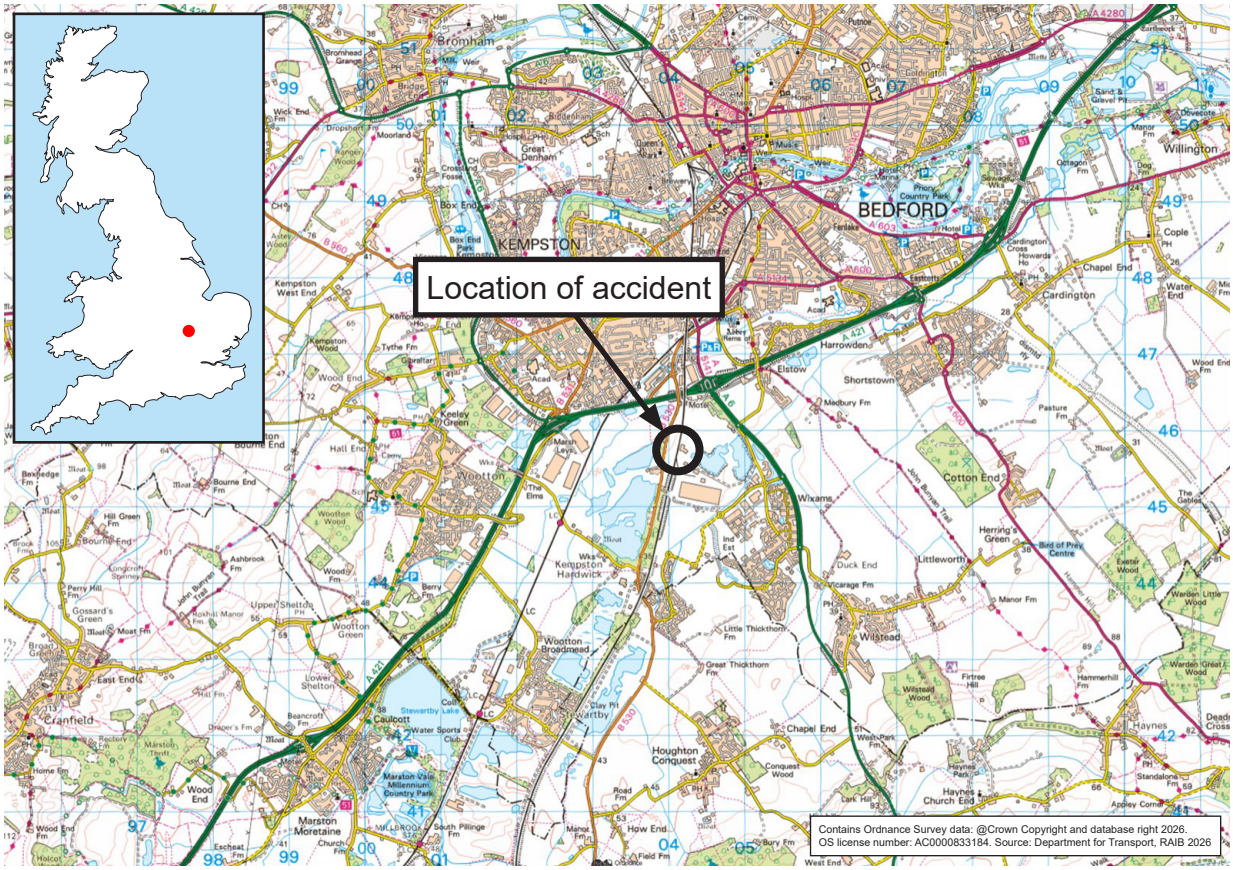

Figure 1: Extract from Ordnance Survey map showing location of the accident at Elstow, Bedfordshire.

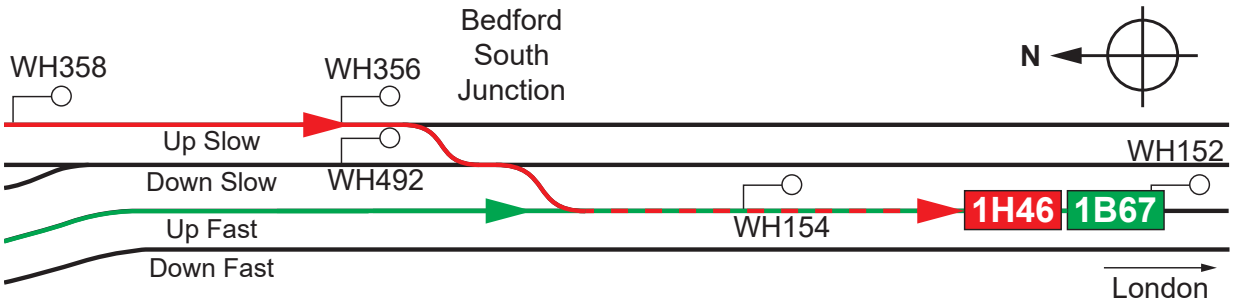

Figure 2: Layout of the track on the approach to signal WH152 (not to scale and not all features are shown for clarity).

RAIB's role and the context of this interim report

7 RAIB is responsible for conducting independent investigations into railway and tramway accidents in the UK. The purpose of its investigations is to improve safety, by establishing the causes of the accident, and making recommendations to reduce the likelihood of similar occurrences in the future or to mitigate their consequences.

8 RAIB does not apportion blame or liability, enforce law or carry out prosecutions. RAIB investigations are independent of those undertaken by other public bodies, such as the Office of Rail and Road, and the railway industry itself. However, we will work alongside investigations being undertaken by others and may share certain physical evidence with them, where this is appropriate and allowed by the law.

9 A final report will be published by RAIB on completion of its investigation. All RAIB investigation reports are available on RAIB's website. If found necessary, during its investigation, RAIB may also issue urgent safety advice to the rail industry.

10 This interim report uses data obtained from several different recording devices which do not share the same time source. To allow a timeline of the accident events to be constructed, RAIB has synchronised all event recordings to one time source, that used by the signalling data logger. It is this corrected time which is quoted throughout this report. Due to the way some data recorders function, short delays (typically less than a second) can elapse between an event occurring and the recording device logging that change. During the collision, some data corruption occurred to both OTDR and CCTV data. Work is ongoing to establish the reliability of the stored data sources on both trains, and this report presents the data as it has been recorded and analysed at this stage of the investigation. Event timings should therefore be considered as having a small degree of inaccuracy.

11 This interim report is based on the evidence gathered and analysed to date, and RAIB's findings should be considered within this context. RAIB's intended future actions for this ongoing investigation are described in paragraph 85. Topics relevant to the accident will be covered in more detail within the final report. This may also result in modifications to the interim findings contained in this report.

Background

The train services and number of people on board

12 Train 1B67 was formed of a five-car class 810 bi-mode multiple unit, number 810015 (figure 3). From saloon and platform CCTV footage, RAIB has so far identified 100 people as being on board this train, including eight EMR staff. This included the train's driver, who was already qualified as a driver and was undertaking additional training to drive class 810 trains, and a driver-instructor, who was with the driver in the cab at the time of the accident.

13 The programme to introduce the class 810 trains on EMR's intercity routes began in December 2025. The train is fitted with internal and external CCTV and OTDR. The internal saloon CCTV on the leading vehicle of the train stopped working due to a fault at around 09:00 on the morning of the accident. The available CCTV footage across the rest of the train ended shortly before the accident, owing to the storage of image data being interrupted by the collision (see paragraph 54).

14 Train 1H46 was formed of a four-car class 360/1 electric multiple unit, number 360115 (figure 3). Using saloon and platform CCTV footage, RAIB has so far identified 157 people as being on board this train, including two EMR staff. These were the train's driver and the guard.

15 Class 360/1 trains were introduced in 2002 and 2003 and have been leased to EMR since 2021. The trains are fitted with OTDR and internal and external CCTV. The onboard CCTV footage stopped recording shortly before the accident, owing to the storage of image data being interrupted by the collision (see paragraph 54). Attempts to recover additional CCTV footage from both trains are ongoing.

Figure 3: Formation of trains 1H46 and 1B67. The Y and Z numbering system was assigned by RAIB after the accident to assist with identifying vehicles.

Parties involved

16 EMR employs the train drivers and onboard staff who were on both trains. It also leases both trains and is the entity in charge of maintenance for them, meaning that it is responsible for their safe maintenance. EMR contracts out this responsibility to Hitachi and Siemens who are the original manufacturers of the class 810 and class 360/1 respectively.

17 The railway infrastructure at this location is owned, managed, and maintained by Network Rail. Network Rail employs the signallers responsible for controlling train movements. It also employs the staff responsible for maintaining the infrastructure.

Features of the route and accident location

18 The accident took place on the Midland Main Line between Bedford and Flitwick stations. The railway at this location runs roughly north to south and has four tracks, consisting of the Down and Up Fast lines (on the western side, which direct trains away from London and towards London respectively) and the Down and Up Slow lines (figure 2). The collision took place on the Up Fast line near the gantry supporting signal WH152, which is located at 47 miles and 29 chains (a chain is 22 yards) from a zero datum at London St Pancras station. On the approach to signal WH152 the railway curves to the right. The maximum permissible speed on the fast lines at this location is 125 mph (201 km/h) for high-speed trains such as train 1B67 and 110 mph (177 km/h) for trains such as train 1H46.

Signalling

Signalling in the Bedford area

19 Signalling in the Bedford area is controlled from West Hampstead power signal box, where signallers use workstations to control the movement of trains. Signal WH154 is a four-aspect automatic signal, which can display green (proceed), double yellow (preliminary caution), single yellow (caution), or red (danger) aspects. Automatic signals change aspect depending on the occupation of track circuits by trains, without the intervention of the signaller. There is no indication on the controlling workstation at West Hampstead as to which aspect these automatic signals are displaying.

20 There is no signal passed at danger (SPAD) alarm associated with signal WH154. SPAD alarms produce a unique tone in the signal box to draw the signaller's attention to a SPAD, should one occur. In some circumstances, SPAD alarms can allow a signaller to intervene, for example, by making a GSM-R (Global System for Mobile Communications - Railway) railway emergency call (REC) instructing all trains in the area to stop.

Automatic Warning System (AWS)

21 All signals relevant to this accident, including signal WH154, were fitted with AWS track equipment. The earliest version of AWS was introduced on the Great Western Railway in 1905. Iterative design improvements followed this initial introduction but the accident at Harrow & Wealdstone in 1952 (in which 112 people died, and 340 people were injured) led to the Ministry of Transport standardising an AWS design for Great Britain's railways in 1956.

22 AWS uses track-mounted magnets which trigger receivers fitted on trains. The system on board the train sounds a clear indication (a bell or the electronic equivalent) when approaching a signal displaying a green aspect, and a warning indication (a horn or the electronic equivalent) to warn the driver when their train is approaching a signal displaying any aspect other than green. This warning indication is intended to alert the driver to the upcoming signal. When receiving a warning indication, a driver must react to this by pressing an acknowledgement button in the cab. If the warning is not responded to within a short timeframe, the train's emergency brake is automatically applied. A clear indication does not require a response from the driver.

23 After an AWS warning indication is acknowledged, a yellow and black visual indicator (often referred to as the 'sunflower') will appear in the cab as a reminder that a warning has been acknowledged.

24 Train 1B67 was fitted with an enhanced Train Protection and Warning System (TPWS) panel in the driver's cab which met the requirements of current industry standards (see paragraph 28 and figure 4). If an emergency brake application results from an AWS warning not being responded to within the set timeframe, a yellow AWS button on this panel will flash to alert the driver as to the cause of the brake demand. This will change to being constantly lit once it is acknowledged (by being pressed). In order to release the brakes on an enhanced TPWS panel, the driver must press the brake release button at the same time as the brake demand indicator light button. This allows the brake to be released 1 minute after the brake demand was initiated.

25 This differs from standard TPWS panels on other trains, such as those on the train the driver of train 1B67 was more familiar with. On these standard panels, there is one red button marked 'Brake Demand' which will flash until acknowledged. A flashing circular yellow button on a standard TPWS panel means that there is a fault detected in the train's TPWS equipment. Once a brake demand is acknowledged on a standard TPWS panel, the brakes will release 1 minute after the brake demand was initiated.

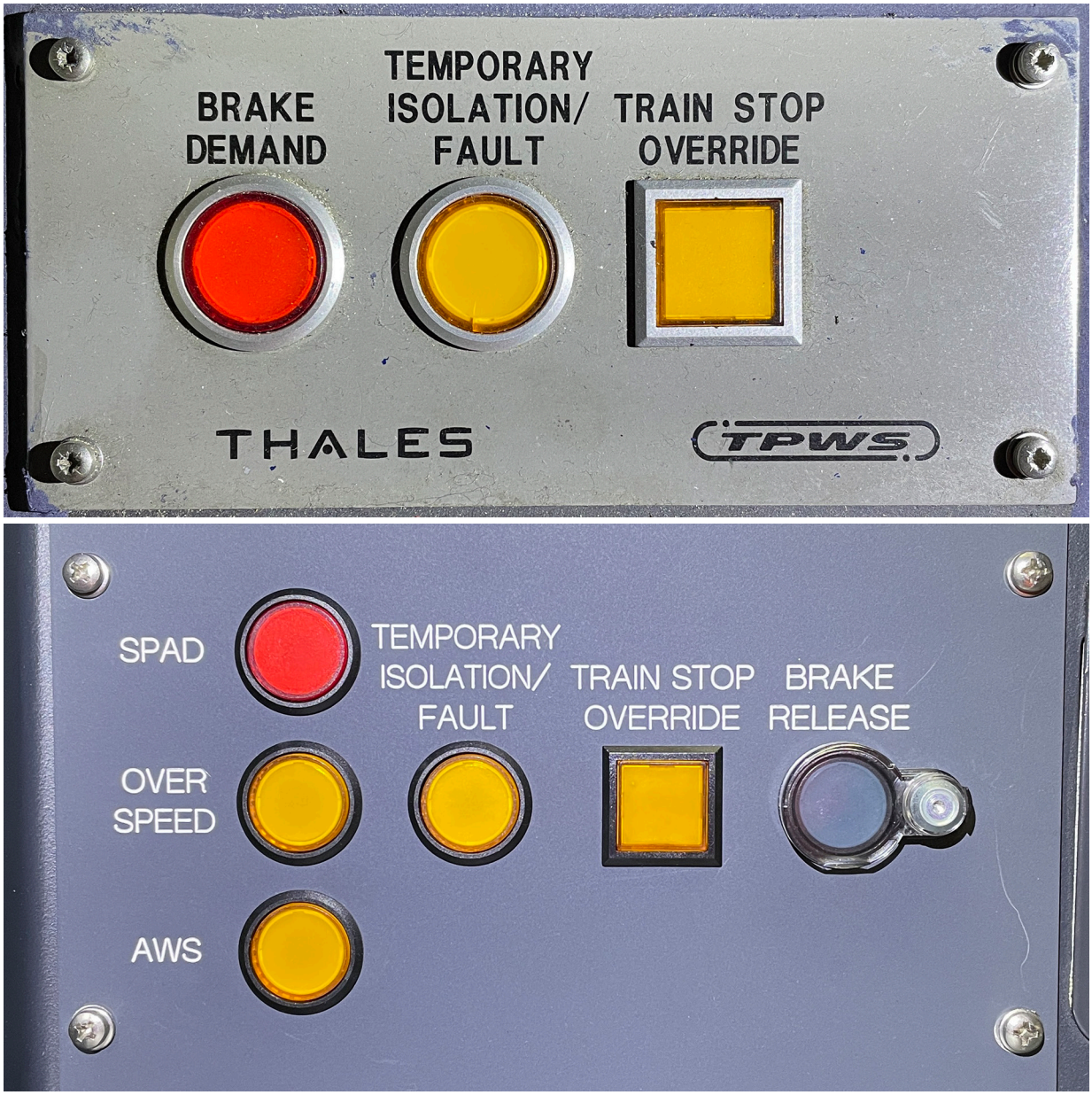

Figure 4: Standard TPWS control panel (top) and enhanced TPWS control panel (bottom).

26 Train 1B67 was required by Rail Industry Standard RIS-0775-CCS, 'AWS and TPWS Application Requirements', issue 3 dated March 2021, to make an emergency brake application automatically if an AWS warning indication was not acknowledged by the driver after 2.7 seconds.

27 AWS track equipment is usually positioned around 3 seconds running time from the associated signal or warning sign, typically at 180 metres. At signal WH154 the magnet is set 162.5 m on approach to the signal. This would give 2.9 seconds of running time for trains which can run at 125 mph (201 km/h) such as train 1B67, and 3.3 seconds for a train capable of running at 110 mph (177 km/h), such as train 1H46.

Train Protection and Warning System (TPWS)

28 British Rail developed TPWS between 1995 and 1999 as an interim measure to address the risk arising from SPADs, until a more comprehensive train protection system could be developed and implemented across the network.

29 Following the 1997 Southall accident (in which seven people died and 139 were injured), the Railway Safety Regulations 1999 were passed into law. These required railway organisations to fit an appropriate train protection system before 1 January 2004. A train protection system was defined as one which would apply a train's brakes if it passed a red signal, where this could cause the train to collide with another train, or if a train travelled at excessive speed in certain circumstances (for example, on approach to a red signal).

30 As TPWS was the only system available which could be implemented on the scale required before the compliance date contained in the regulations, fitment of TPWS was rolled out across the mainline railway in Great Britain.

31 Following the 1999 Ladbroke Grove accident (in which 31 people died and 258 people were injured) the deadline for fitment of TPWS was brought forward to 2003 by the Health and Safety Executive (then the safety regulator for Britain's railways).

32 TPWS uses radio frequency transmitters (known as 'loops') placed between the rails. When used at signals, a pair of loops is placed at the signal itself. This is known as a train stop system (TSS). These loops are energised when the signal shows a red aspect. The TPWS equipment installed on the train consists of a TPWS receiver, a combined AWS/TPWS control unit and a TPWS visual indicator in the cab. Should a train pass over the TSS loops when they are energised, the equipment on the train will detect this and generate an emergency brake demand.

33 An overspeed sensor system (OSS) is also fitted on the approach to some signals. This applies a train's brakes automatically if a train approaches a red signal at a speed higher than a predetermined limit. A train driver will receive a visual indication that a TPWS brake demand has occurred and will be required to acknowledge the demand as part of resetting the system.

34 TPWS is not a failsafe signalling system; it is designed to reduce the likelihood and consequences of an undesirable event. It is also not intended to intervene across the full range of train speeds.

35 Signal WH154 was not fitted with TPWS track equipment.

36 The Railway Safety Regulations 1999 provided specific exceptions to the fitment of a train protection system. This included circumstances where passing a red signal could lead to '*…a train colliding with the rear of another train travelling in the same direction on the same track*'. This meant that signal WH154 was not required by law to be fitted with TPWS. Despite this, automatic signals on plain line such as signal WH154 may be fitted with TPWS if the SPAD risk is deemed sufficiently high by the infrastructure manager (in this case, Network Rail).

SPAD risk assessment

37 The risk of SPADs is managed by Network Rail through a process documented in standard NR/L2/SIG/14201, 'The Signalling Risk Assessment Handbook', issue 6 dated December 2025. This process requires each signal to be risk assessed at least every 5 years and following specific trigger events. This risk assessment is carried out using the signal overrun risk assessment tool (SORAT) which produces a fatalities and weighted injuries (FWI) score. FWI is a risk metric used to combine predicted fatalities and non-fatal injuries into a single score. It assigns proportional severity weights (such as counting a major injury as a fraction of a fatality) to measure total harm and safety performance over time.

38 On 29 October 2025, signal WH154 was risk assessed by Network Rail, which calculated the risk as being 3.844×10^{-7} FWI/year. This score places signal WH154 into the category of signals with a low SPAD risk. A signal is required to score over 3.000×10^{-5} FWI/year to be taken through the more detailed variable SPAD probability model (VARISPAD) which considers qualitative data in consultation with the train operating companies. There are 1,260 signals in Great Britain which meet the threshold for the VARISPAD process. Fitment of a TSS at a plain line automatic signal is a possible outcome from the SORAT/VARISPAD process, where the level of risk justifies it. This is normally driven by a feature such as a station which would cause a train to stop and therefore increase the likelihood of a collision following a SPAD.

Environmental factors

39 A weather station 3.0 km (1.9 miles) from the accident site recorded that it was 28 degrees Celsius with clear skies and no wind at 17:53 on 19 June 2026. The accident occurred during a longer period of hot and dry weather.

40 The railway runs on a north-south axis at signal WH154. At the time train 1H46 approached the signal on the day of the accident, the sun was to the right of the train in the direction of travel. Network Rail's fault management system contains no driver reports of sunlight, glint or glare reflections relating to this signal.

Sequence of events

41 At 14:52 on 19 June 2026, the driver of train 1H46 signed in for work at St Pancras station. Their first planned task was to drive a passenger service from St Pancras to Corby. This service departed from St Pancras at 15:15 and arrived at Corby at 16:24. Station CCTV footage shows the driver changing ends and reaching the south end cab at 16:28, where they spent a few minutes talking to colleagues before boarding the train. At 16:32, after setting up the cab at this end of the train, the driver got out of the cab. Station CCTV footage shows them apparently checking that the required head lights on the front of the train were illuminated. The driver got back into the cab and train 1H46 departed from Corby for St Pancras on time at 16:40.

42 Train 1B67 had departed from Nottingham station 3 minutes late at 15:53. This was logged as being caused by a ‘door fault’ by the EMR operations supervisor at Nottingham station, and the train’s OTDR recorded that the rear cab door was not detected as being closed. The late departure meant that train 1B67 followed another train which had the effect of increasing the delay, so that train 1B67 arrived at Leicester at 16:24, running 14 minutes late.

43 Having departed from Leicester station, train 1B67 was further delayed by an unrelated operational incident at Knighton Tunnel. This meant that it arrived at Kettering, its last station call before the accident, at 16:54, now 19 minutes late. It then passed nonstop through Bedford station on the Up Fast line at 17:09, by which time it was running 18 minutes late.

44 Following its departure from Corby station, train 1H46 called on time at Kettering at 16:47, and at Wellingborough at 16:55. It then arrived on time at 17:09, in platform 1 at Bedford station on the Up Slow line. Train 1B67 passed train 1H46 in Bedford station.

45 At 17:10:13, data from railway systems recorded train 1H46 leaving platform 1 at Bedford station on the Up Slow line. FFCCTV footage shows that the signal granting the authority to depart from Bedford station, signal WH358, was displaying a single yellow aspect. This tells the driver that they can pass the signal but should be prepared to stop at the next signal as it may be displaying a red aspect (as it was at that time).

46 Train 1B67 had been travelling on green signals on the approach to, through and beyond Bedford station. At 17:10:42, the OTDR for train 1B67 recorded that an AWS warning indication was generated. At this point train 1B67 was in the vicinity of the AWS magnets for signal WH154 while travelling at 123 mph (198 km/h). FFCCTV from train 1B67 shows that signal WH154 was displaying a green aspect, meaning that the AWS system should have generated a clear indication and not a warning indication.

47 At 17:10:45, the OTDR for train 1B67 recorded an emergency brake application. The OTDR did not record the AWS acknowledgement button being pressed between the AWS warning being generated and the emergency brake application.

48 The train came to a stand at 17:11:31. The train stopped with the leading end of its third vehicle directly underneath the gantry carrying signal WH152. Data from railway signalling systems recorded that the track circuit for the section of track on which train 1B67 was standing was shown as occupied. As a result, the preceding signal, WH154, continued to display a red aspect, to protect train 1B67 from other train movements.

49 Although the front of train 1B67 was beyond signal WH152, signal WH152 continued to display a green aspect. As this signal is an automatic signal, train 1B67 needed to travel beyond the end of the ‘overlap’ for this signal for it to display a red aspect. An overlap is a section of track beyond a signal, in this case 190 metres long, which is provided as a safety margin in which a train can stop before reaching a point of conflict with another train.

50 At 17:11:58, the OTDR for train 1B67 recorded that the driver initiated a GSM-R radio call to the signaller. In the recorded voice communications for this call, the driver reported to the signaller that there was an AWS fault with the train.

51 As this was happening, train 1H46 continued to travel on the Up Slow line towards Bedford South Junction. At 17:11:25, signal WH356, which protected the junction, changed from a red to show a single yellow aspect with an illuminated junction indicator. The junction indicator informed the driver that their train was being routed over the junction and onto the Up Fast line. Analysis of train 1H46's OTDR shows that the driver applied traction power shortly after the signal changed from red to single yellow, suggesting that the driver saw the change in signal aspect and responded to it.

52 At 17:11:40, as train 1H46 approached signal WH356, its OTDR recorded that the AWS system generated a warning indication for the single yellow signal ahead, which the driver promptly acknowledged. Train 1H46 continued past signal WH356 and then crossed onto the Up Fast line at the junction.

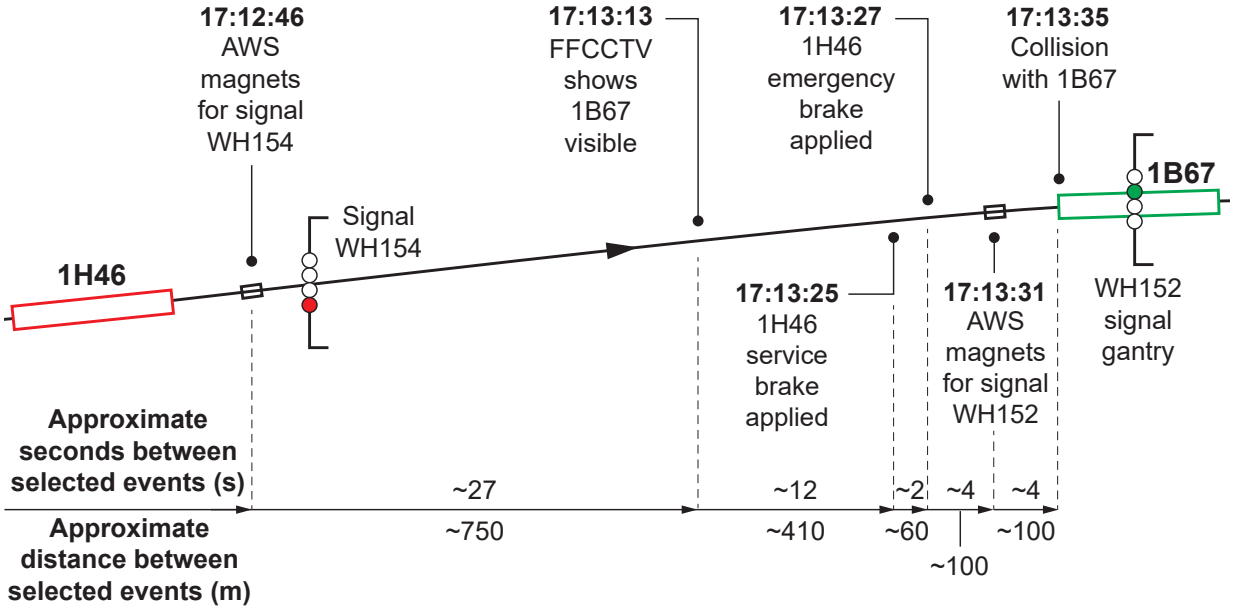

Figure 5: Train 1H46 approaching the rear of train 1B67 (not to scale and not all features shown for clarity).

53 At 17:12:46, train 1H46 received an AWS warning indication associated with signal WH154 (figure 5). FFCCTV images show that this signal was displaying a red aspect as the train approached. The OTDR from train 1H46 recorded that the driver acknowledged the AWS warning indication, but the train continued to accelerate towards and beyond the signal, which it passed at 17:12:53.

54 Train 1B67 first becomes visible in FFCCTV images from train 1H46 at 17:13:13. This footage ends approximately 2 seconds later. The available rear-facing CCTV from train 1B67 ends before this train came to a stand, so images of the approaching train 1H46 are not captured.

55 Analysis of the data from train 1H46's OTDR shows that the driver reduced the traction power demand from 17:13:24 and then made a full-service brake application at 17:13:25. The OTDR recorded an emergency brake application at 17:13:27 when the train was travelling at around 75 mph (122 km/h). It is likely this sequence represents the driver of train 1H46 detecting the presence of train 1B67 on the line ahead and responding to it.

56 The driver of train 1B67 finished their call with the signaller regarding the reported AWS fault at 17:13:29.

57 About a second later, train 1H46 passed over the AWS magnets associated with signal WH152 and, shortly afterwards, collided with the rear of train 1B67 at around 17:13:35. The OTDR for the leading vehicle of train 1H46 recorded the train's speed as being around 50 mph (80 km/h) at the point of collision (figure 6).

Figure 6: Aerial view of the accident site. Train 1H46 is to the left and train 1B67 to the right of the image.

Events following the accident

58 In the immediate aftermath of the collision, the driver of train 1B67 realised that their train had derailed and that this presented a potential risk of collision with a train passing on an adjacent line. As the train had lost power in the collision, the driver could not make a GSM-R REC. They therefore worked with the train manager to place track circuit operating clips on the adjacent lines (these clips are emergency equipment which simulates the presence of a train, causing signals on the approach to change to red).

59 The guard on board train 1H46 had been riding in the rear cab and was knocked down by the force of the impact. They regained their feet and attempted to make a REC using the rear cab's GSM-R radio. However, they found there was no power to onboard systems. After freeing themself from the rear cab, the guard attempted to reach the leading cab to speak with the driver but found that they were unable to move forwards from the rear vehicle due to damage.

60 The West Hampstead signaller had received a report of a loss of power to overhead line equipment (OLE) in the area of Bedford South Junction. The signaller was unable to contact the drivers of either train 1H46 or 1B67. So, at 17:18, they contacted the driver of train 9T53, which had been held, facing southwards, at signal WH492 (on the same gantry as signal WH356 but for the Down Slow line, figure 2), to ask if they could see anything which would explain the power outage. The driver of train 9T53 responded that they could not see anything to explain the loss of power.

61 At 17:19, the signaller received the first report of the accident from a passenger who was using a signal post telephone at the gantry for signal WH152. This was followed shortly thereafter by another call from the same signal post telephone from the driver of train 1B67 who also reported the accident. The signaller confirmed to the driver that power to the OLE had been switched off, that train movements through the area had been stopped, and that the emergency services were on the way.

62 Bedfordshire Fire and Rescue Service was notified of the accident at 17:14 by a 999 call from the train and passed this information to Network Rail's control room in Derby. The first emergency service to arrive at the scene of the accident was Bedfordshire Police at 17:24, followed by Bedfordshire Fire and Rescue Service at 17:28. The East of England Ambulance Service had multiple ambulances on scene by 17:35. British Transport Police declared a major incident at 17:35, and arrived at the scene at 17:37.

Consequences of the accident

63 The driver of train 1H46 was fatally injured in the accident, while still situated in the train's driving cab.

64 RAIB is using CCTV images (paragraphs 12 and 14) and working with British Transport Police and EMR to collect information about those who were on board the trains. Although some CCTV images are incomplete, RAIB has so far identified that 257 people were on board the trains during the accident. At least 160 people received injuries during the collision, with 102 people taken to hospital.

65 Both trains involved in the accident derailed. All the vehicles remained broadly in line and upright.

66 During the collision, the leading driving cab of train 1H46 and the rear cab of train 1B67 became embedded together (figure 7), and the trains travelled together for approximately a vehicle length before coming to a stop. As a result of the collision, the combined total length of the trains reduced by around 9 to 10 metres.

67 Modern trains are designed to absorb energy at the initial point of impact (in this case the cab ends) and at the intervehicle interfaces, which are designed to deform during a collision. An initial examination of the rail vehicles involved by RAIB showed substantial damage to the structure of both trains at the point of impact as well as at all the intervehicle connections (figure 8).

68 The interior of both trains suffered varying degrees of damage with train 1H46 suffering more interior damage than train 1B67. The external windows in the passenger areas of both trains remained intact. Railway infrastructure was also damaged.

Figure 7: Side view of the collision (image created from laser scans).

Figure 8: Damage at vehicle ends.

The investigation

69 RAIB was notified of the accident by Network Rail around 15 minutes after it happened. RAIB immediately deployed a team of inspectors, with the first inspector arriving on site at 18:26.

70 Once on site, RAIB worked alongside British Transport Police, the Office of Rail and Road, and the railway companies involved to secure the necessary evidence to support its independent safety investigation. This included recovering the OTDRs from the trains, some of which could only be extracted during recovery operations. CCTV recordings, signalling data and recordings of radio communications were also obtained. The vehicles involved were surveyed for internal and external damage, including using laser scanning and an aerial survey. RAIB inspectors also supervised the testing of signalling equipment in the area.

71 The recovery of the trains involved vehicles being lifted by crane and moved by road to secure storage. RAIB inspectors co-ordinated with rail industry recovery teams to undertake this work. RAIB also liaised with Network Rail to facilitate the repair work needed to restore railway operations.

72 Once the last vehicles had been lifted off the railway and onto adjacent land, RAIB released the site of the accident to Network Rail on the afternoon of 23 June 2026, to allow for the completion of repair work. RAIB inspectors and support staff continued to secure evidence at the site of the accident and at nearby locations until the last vehicles were moved off site on 27 June 2026.

73 Since the accident RAIB has:

- inspected and surveyed the accident site
- placed the damaged trains in a secure location to allow for further testing and analysis
- established the number of people on board each train and started the work to identify who was injured, and how they received their injuries
- downloaded and analysed evidence from the OTDR and CCTV systems on both trains, as well as obtaining data from other trains operating on this route
- obtained signalling and other electronic records
- gathered physical and documentary evidence
- supervised the testing of signalling equipment in the area of the accident
- supervised the testing of the AWS and TPWS equipment on the leading vehicle of train 1B67
- gathered evidence from witnesses.

Findings to date

Train 1B67

74 Data from the OTDR of train 1B67 recorded that an AWS warning indication was provided to the driver at signal WH154. This was despite this signal showing a green aspect, which should have triggered an AWS clear indication that would not have required any response from the driver. The driver responded to the AWS warning indication by placing the power brake controller into coast (that is, with no traction power or braking applied).

75 OTDR data shows that this AWS warning indication was not acknowledged within the permitted 2.7 second time window, and so an emergency brake application was automatically triggered.

76 OTDR data and witness evidence showed that the yellow AWS button started flashing on the enhanced TPWS control panel once the brake application was triggered. Witness evidence was that the train control and management system (TCMS) generated a major fault alarm because of the emergency brake application. Data downloaded from the TCMS shows that the TCMS acknowledgement button was pressed by the driver after the brake application generated the alarm.

77 The driver reported to the signaller via their GSM-R radio that there was an AWS fault with the train. The recording of this call includes a loud alarm sounding continuously in the cab in the background. Hitachi has confirmed to RAIB that this was the AWS warning indication and that a loudspeaker above the driver's head provides the audible alerts from the AWS/TPWS system.

78 Witness evidence was that the alarm was coming from the loudspeaker above the driver's head and that neither the driver nor driving instructor recognised this sound as being an AWS warning indication. Witness evidence, supported by OTDR evidence, is that the AWS acknowledgement button which would have silenced this alarm was not pressed.

Train 1H46

79 OTDR data from train 1H46 shows that its driver controlled the speed of the train as it left Bedford and that they promptly acknowledged the AWS warning indication for signal WH356, which was showing a restrictive single yellow aspect. When passing a single yellow aspect, train drivers are trained to expect the next signal to be displaying a red aspect and to control the speed of their train to allow them to stop before it.

80 OTDR data also shows that the driver of train 1H46 started to accelerate from around 49 mph (79 km/h) shortly before receiving the AWS warning indication for signal WH154, which was showing a red aspect. OTDR data shows that they acknowledged the AWS warning indication for this signal but continued to accelerate, reaching a maximum speed of 76 mph (122 km/h). The driver of train 1H46 initially applied the full service brake around 10 seconds before the collision, approximately 260 metres from the rear of train 1B67. About 2 seconds later, the emergency brake was applied, around 200 metres before the point of collision. The last available footage from train 1H46's FFCCTV is around 600 metres from the rear of train 1B67. At this point, train 1B67 is visible but it is not possible from the footage to determine if the train is on the same line as train 1H46 due to track curvature. A train driver may experience the same limitation of visibility.

Signalling

81 According to a database maintained by the Rail Safety and Standards Board (RSSB), there have been no previous recorded instances of trains passing signal WH154 when it was displaying a red aspect since records began in 1985. However, it is likely that the signal is very rarely encountered in this state. RSSB analysis indicates that before the accident, no train encountered a red aspect at signal WH154 in 2026.

82 During the site phase of the investigation, RAIB supervised functional testing by Network Rail of the elements of the signalling system relevant to the accident, including the AWS track equipment at signal WH154. Network Rail found no faults with the signalling system.

83 On 9 July 2026, another class 810 unit approaching signal WH154 incorrectly received an AWS warning indication while this signal was displaying a green aspect. In this case, the driver acknowledged the incorrect warning indication within the 2.7 second response window. They reported the matter to the signaller immediately, and the train was able to continue its journey.

84 Further investigation following this second incident found that the electromagnet within the AWS track equipment (which is energised only when a green aspect is shown, and interfaces with the AWS equipment on the train to produce the AWS clear indication) was positioned lower than the associated permanent magnet. It was also positioned 16 mm below railhead level, outside the required tolerance of ±12 mm. Work is continuing to understand the interface between the AWS electromagnet at signal WH154 and the AWS equipment on train 1B67, which led to the driver receiving a warning indication with the signal displaying a green aspect. RAIB has found no evidence that the AWS electromagnet was not correctly energised.

RAIB's investigation

85 RAIB will continue to investigate:

- the actions of those involved and any factors that may have influenced them
- the reasons why train 1H46 passed signal WH154 at danger
- the status and performance of the braking, AWS and other safety systems on train 1H46

- the reason train 1B67 was stopped
- the status of signal WH154 and its AWS equipment, as well as the signal's positioning, visibility, and conspicuity
- the crashworthiness performance of both trains during the collision
- the emergency response to the accident
- the processes used to assess the risk of overrun at this location, and the effectiveness of any control measures intended to address this
- any relevant underlying factors, including any actions taken in response to previous relevant safety recommendations.

Rail Accident Investigation Branch

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